

# Everything *but the* Squeal

BY SHELBY JONES

PHOTOGRAPHY BY JIM RATHERT

The variety of products made from wood residues show how we can use everything given to us by nature.

Converting raw natural resources like timber into consumer goods requires both efficiency and environmental awareness. While sawmills were once interested only in how many boards could be produced, today's wood processing plants try to recover a product from everything hauled from the woods. Like a thrifty hog farmer, modern sawmills use almost "everything but the squeal."

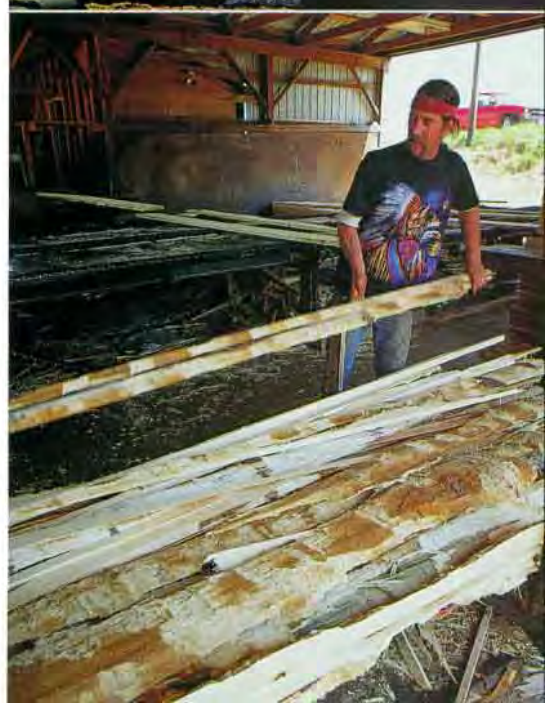
Lumber is a commodity so readily available it is taken for granted. At a sawmill rectangular pieces of lumber are sawed from logs that are nearly round. Taking "square" pieces from something cylindrical makes odd shaped pieces of waste as well as sawdust for each cut made.

But this waste is now considered a valuable by-product that can meet some of our everyday needs.

When solid wood products are manufactured from logs there are three basic types of residues created.

**BARK** This outer covering is often removed from the logs prior to processing to aid the sawing equipment efficiency. Bark accumulates dirt, sand and other foreign matter. By removing the abrasive bark, saws stay sharper longer.

**COARSE RESIDUES** The larger pieces (called slabs) off the outside of logs, edgings from individual boards, and end trim when the boards are cut to a desired length. Coarse residues may have bark







attached if the logs were not debarked.

**FINE RESIDUES** Mainly saw dust and smaller particles of bark that are created during handling and processing logs and lumber.

Bark has become a valuable by-product because of the many ways it can be used in landscaping and horticulture. It is used to mulch around trees and shrubs and is available in both bulk and bagged quantities.

In many cases, bark is further processed by grinding or sizing. Then it is combined with sand, nutrients or other organic materials to produce products for potting flowers, shrubs and young trees.

Bark can also be burned for energy purposes or yield chemical compounds for medicinal, household products and even waxes for cosmetics. In Missouri, most bark is used for mulch or burned for energy. Little goes unused.

Coarse residues that have had the bark removed are most often processed into chips, which are used to make paper products. Chips could also be used to make particle board or any of several other similar products in which small pieces of wood fiber and adhesives are compressed into panels or sheets. This same process can also produce molded shapes such as counter tops, toilet seats or trim for the inside of a house. More "reconstituted" wood products are introduced every year and the future is bright for many more.

Of course, many small saw mills in Missouri do not debark their logs, thus producing coarse residues that still have the bark attached. Far from being unusable, this is the major source of raw material for making charcoal. If you use charcoal briquettes to barbecue, you have probably used a former waste product from a Missouri saw mill.

The charcoal industry uses virtually all barky slabs and edgings produced by saw mills throughout the state. It has a steady supply of raw material, no additional harvesting of trees is necessary and the



Wood residues (overleaf) and the products made from them (left) Saw dust is pressed into pellets, bark is used for mulch, and slabs and edgings are made into charcoal. Debarked slabs are also made into pulp for paper. Saw dust is burned (above) to heat wood-drying kilns.

saw mills have a viable market rather than a disposal cost. This is the kind of symbiotic relationship that is being sought for other residues.

Saw dust is the wood residue that has been the most difficult to recycle. Lack of uses has created large piles at many saw mill locations. Some piles in southern Missouri contain, at their core, saw dust that is decades old.

Natural decomposition of the saw dust and water percolation through the pile results in a foul-smelling run-off which occasionally becomes a water quality concern. You might call it a natural compost, but entrepreneurs have only recently become aware of its potential. Ideas for new products are constantly being sought.

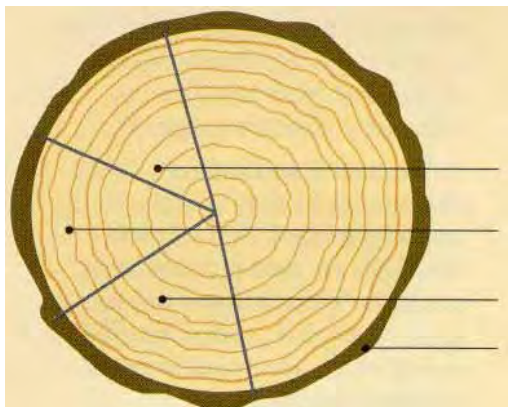
Wood manufacturing in Missouri produces over 760,000 tons of saw dust annually. Markets and uses currently exist for only about 340,000 tons or 44 percent, of the total. Why is it so difficult to find uses for this material?

Nearly all of this saw dust is green. That means it contains a large amount of water, sometimes more water than actual wood fiber.





## FROM TIMBER TO TWO-BY-FOURS



Figures are for a 14-inch diameter red oak log by weight.

Slightly over one half of a log becomes lumber, but most of the residue is also used.

Bark 14%

Chippable Material 16%  
(slabs and edging)

Sawdust 19%

Lumber 51%

The high moisture content makes it heavy (20 or more pounds per cubic foot), so it is expensive to transport any distance.

High moisture content also means that special burners and fuel handling systems must be used if saw dust is to be burned as an energy source. The heating value of green saw dust can be less than 3,000 BTU

per pound as compared with a pound of dry wood at over 8,000 BTU.

Saw dust normally contains particles smaller than can be seen with the naked eye up to a maximum of about 1/4-inch long. Wood fibers of this length do not have enough strength for either paper or particleboard.

These problems and others are currently the focus of a group of state agencies and private industry representatives. The group is composed of people with expertise in environmental regulation, technical assistance, marketing, financing, energy and small business operation.

The large amount of saw dust available in existing piles as well as new saw dust is both a marketing opportunity and environmental concern. Some of the ideas being explored and promoted are:

### ◆ DENSIFIED FUEL PELLETS

Saw dust is dried and compressed into pellets about 1/4-inch in diameter and 1/2-inch long. The natural binders in the wood hold the pellet together, so addition of adhesives is unnecessary. These pellets are burned in special stoves or furnaces that are among the most efficient in use today. Homeowners can enjoy the comforts and economy of wood heat without the bother associated with cutting and storing firewood. Annual production of densified fuel

## Empty Holes, Piles of Dust

by Carl E. Brown

The land was a moonscape. The terrain was steep, often jagged and cut with severe erosion. The surface was 20 acres of barren ground covered with black and red acidic spoil materials. Little vegetation could survive. A acid-laden water flowed freely from the site

into an otherwise clear upland creek.

This site happens to be near Eldon, but there are over 100,000 acres of abandoned coal mines from the northeast to the northwest to the southwest corners of Missouri.

In the old days of abandoned coal mine reclamation, 5 or 10 years ago, we used the best science and technology known at that time to reclaim devastated lands. That usually involved regrading the barren spoil ridges to more stable slopes, liming and fertilizing, and seeding with the most hardy grasses we knew. That worked fine much of the time, but after a few years some of the sites started to look a bit ragged.

Fortunately, we're the "Show-Me" state and we picked up some good ideas from other state land reclamation programs around the country. For several years, other

states have used organics such as municipal sewage sludge, composted garbage, yard waste and the like for mine reclamation.

In Missouri, we don't have much of these organic sources near our reclamation sites, but we do have rotten saw dust. As a pilot study we have incorporated 50 tons of saw dust per acre on three reclamation projects so far. That may sound like a lot, but it only amounts to about a one inch layer over the surface of the ground before it is tilled in. However, that one inch will bring the organic matter content of the top layer of our new "soils" up to about five percent, normal for a fairly rich farm soil but a bit low for native prairie land.

Chemically and physically, saw dust is similar to the expensive bagged peat moss you may have bought at the store. With a little fertilizer added, it makes a great soil conditioner.

pellets in Missouri is projected to reach approximately 60,000 tons in the next two years.

◆ **CARBONIZED PRODUCTS** (charcoal, activated carbon, carbon black and others) Wood is 50 percent carbon, a substance that seemingly has a bright future for many "space age" products. New technologies enable saw dust to be manufactured into a myriad of carbon-based products without emission of smoke or other air pollutants.

◆ **BIOREMEDIATION OF CONTAMINATED SOIL** Saw dust can be mixed with soil contaminated by toxic chemicals and then inoculated with microbes which consume the toxic compounds. The resulting "clean" soil is safe to use for horticultural products, soil additives and gardening.

◆ **CO-COMPOSTING WITH OTHER ORGANIC RESIDUES** Decomposed saw dust has a wide variety of potential uses for growing plants and grasses, and reconditioning soils. By combining saw dust (especially from old, existing piles) with such residue

as egg shells or used poultry litter, soil additives can be manufactured to correct a variety of needs. Mixtures and testing procedures are being developed that will improve the quality of compost made with saw dust.

◆ **ENERGY SOURCE** Saw dust is currently being emphasized as an inexpensive fuel for schools and other public buildings, industrial processes and lumber drying kilns. Many of these are located near saw mills, thus reducing transportation costs. Retrofitting old boilers to burn green saw dust can be expensive, but savings in fuel costs make these projects economically attractive.

◆ **STRIP MINE RECLAMATION** The Land Reclamation Program of the Missouri Department of Natural Resources has begun mixing decomposed saw dust into soils on reclaimed mine sites. According to Carl Brown, the Department of Natural Resource project coordinator, "15,000 tons of saw dust will be tilled into about 300 acres of heavy clay and toxic spoils each year

to improve tilth, water- and nutrient-holding capacities, and generally make life easier for plants, insects and animals in the new soils." Over 11,000 acres of privately owned abandoned mine lands are candidates for similar treatments.

◆ **ALCOHOL PRODUCTION** Green saw dust can be used to make methanol and ethanol. Both of these chemicals are used in many other products. Work is underway to improve alcohol production efficiency which may result in better economic payoff.

The variety of products made from wood residues show how modern manufacturers can use everything given to them by Mother Nature.

The wood products industry is keeping up with the need to use natural resources more efficiently to ensure a future supply. Someday we may be successful in finding a use for the "squeal."

Shelby Jones is a forestry staff supervisor with the Conservation Department.

Piles of saw dust and lime await the spreaders at this reclamation site near Eldon. Adding fertilizer to saw dust makes a good soil conditioner.

If we achieve the results we expect, we could potentially apply 50 tons of saw dust per acre on 100 to 200 acres each year. On a small scale, you can till rotten saw dust into your garden soil to make it richer and better aerated. The organic matter also improves the water- and nutrient-holding capacity of the soil, among other things. You can apply saw dust without fertilizer mulch your garden, trees and flower beds to keep down weeds and conserve soil moisture.

Back at the reclamation site, the dozers and scrapers have moved a lot of dirt around. When the earthmoving is done it will be time to spread the saw dust, lime and fertilizer, and disk everything in. Next spring a

mixture of native warm-season prairie grasses and plants will be seeded. In a season or two many species of wildlife will return to this renewed land to raise the first generation of their young seen here in decades.

This land won't be fully healed yet, but it will be well on its way.

And it all started when a coal miner abandoned an empty hole, and a saw miller laid up a pile of dust. A

Carl Brown, a former forester, administers waste water grants and loans for the Water Pollution Control Program of the Department of Natural Resources.

